PATENT SPECIFICATION

DRAWINGS ATTACHED

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1,193,377

1,193,377

Date of Application and filing Complete Specification: 4 March, 1968.

No. 10432/68.

Application made in Germany (No. Sch40394 XII/47b) on 15 March, 1967.

Complete Specification Published: 28 May, 1970.

Index at acceptance: —E2 F(1B, 1T1)

International Classification: —F 16 c 11/06

COMPLETE SPECIFICATION

A Ball and Socket Joint

We, KARL SCHMIDT GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, of 10 Christian-Schmidt Strasse, 7107 Neckarsulm, Wurttenburg, Germany, a body corporate organised under the Laws of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a ball and socket joint of the kind used as supporting and guiding joints in the construction of vehicles, particularly for the front axles.

A ball and socket joint consists of a ball head which rotatably works in a spherical socket. Diverse types and forms of construction of such ball and socket joints have been proposed in the art. Besides forms of construction which consist entirely of metal, there are other in which the bearing surface or a thin sliding contact layer consists of plastics. Since ball and socket points sometimes carry considerable loads, as is the case for instance in the track rods for steering motor vehicles, proposals have already been made to provide ball and socket joints of inherently resilient construction. Such joints have the incidental advantage of automatically taking up wear and of thereby in the course of use avoiding the creation of clearances, or at least of clearances exceeding standard tolerances. In one previously proposed ball and socket joint, the core of the ball is enveloped by a spherical plastics layer and the elastic resilience of the joint, which implies that it automatically compensates clearances, is provided by a helical spring which, through an interposed concave plate, urges the ball head into its socket.

Since very large numbers of ball and socket joints are nowadays used in mechanical engineering, the joint is not merely required to function satisfactorily, but its cost of production is also a decisive consideration.

It is, therefore, an object of the present invention to provide a ball and socket joint of simple construction which is cheap to produce, but which will nevertheless satisfy most requirements as to load-bearing capacity, elasticity and ability automatically to compensate wear.

According to the present invention there is provided a ball and socket joint, comprising a ball-headed shaft, a socket and a one-piece bearing shell interposed between the ball head and the interior of the socket, the bearing sheel being approximately spherical but deviating from the spherical in some regions such that in some regions it closely engages the ball head but in other regions is spaced therefrom to provide a resilient support between the ball head and the interior of the socket.

The bearing shell thus provides not only location, i.e. an exact location of the ball head, but also applies resilient pressure to the polar regions of the ball head, so that the latter can yield in this direction which, in the example of a track rod, coincides with the axis of the ball-headed shaft. This construction provides a simple ball and socket joint which can be produced at low cost, which is adapted automatically to take up clearance caused by wear, and which despite its simplicity satisfies all the other requirements such a joint is expected to meet.

In a preferred embodiment of the invention, the bearing shell is provided in the region of one or both of its poles with prongs or teeth centrically converging towards the pole or poles and having a radius of curva-

[*Price 5s. 0d.*]

ture that is less than that of the other regions of the bearing shell which conform to the curvature of the ball head. When such a bearing shell is drawn over a ball head only the marginal portions of the prongs or teeth can bear on the surface of the ball head. This circumstance generates the desired resilient spring effect when the ball head carrying the shell is inserted into its socket.

The bearing shell is preferably made of spring steel. If the shell is subjected to large loads and sliding displacements, it is desirably to coat the internal surface of the bearing shell with a suitable sliding layer of metal or of some appropriate synthetic plastics material.

In order to enable the invention to be more readily understood, reference will now be made to the accompanying drawings, which illustrate diagrammatically and by way of example some embodiments thereof, and in which:—

Figure 1 is a cross-section through a ball and socket joint,

Figure 2 is a side view of a bearing shell,

Figure 3 is a cross-section showing the bearing shell of Figure 2 on a ball-headed shaft,

Figure 4 is a cross-section through another ball and socket joint,

Figure 5 is a cross-section through part of yet another ball and socket joint,

Figure 6 is a side view of a bearing shell, and

Figure 7 is a plan view of a blank for forming into the bearing shell shown in Figure 6.

Referring now to Figure 1, there is shown a bearing shell 1 which in the region of its upper pole is formed with incisions 2 radiating away from the pole and giving rise to the formation of prongs or teeth 3. When such a bearing shell is inserted into a socket 4 these prongs have a spring effect between the socket and the ball head 5, and in the embodiment illustrated in Figure 1 this resilience operates principally in the direction of the longitudinal axis 6 of the ball-headed shaft.

The shell 7 illustrated in Figure 2 may be formed with incisions 2 converging towards each of the poles thereby generating a double-acting spring effect in the manner described with reference to Figure 1.

Figure 3 shows the bearing shell 7 according to Figure 2 after having been pulled over a ball head 5. When inserted into a socket like the socket 4 shown in Figure 1, the peripheral portion A of the ball head 5 is forced into close contact with the inside wall 8 of the shell 7. Figures 4 and 5 illustrate other possible shells 9 and 10 in position on ball heads and inserted into sockets. Figure 4 shows a bearing shell similar to that shown in Figure 1, the inside of which is contacted only in the upper and lower regions by the ball head, thus providing the spring effect in the region remote from the shaft. Figure 5 shows a similar bearing shell 10 which closely engages the ball head remote from the shaft and provides the spring effect in the region of the shaft. Figure 6 shows a bearing shell 11 in which incisions 12, which radiate from the two poles, overlap in the region of the equator of the shell 11. The region of overlap corresponds to the width B in Figure 7 which illustrates a blank 13 from which a shell 11 according to Figure 6 is produced by a process of bending. The fact that the cut edges 14 are parallel permits the blanks to be economically produced. The shell 11 has the advantage that it can resiliently adapt itself to the spherical head of the ball-headed shaft both in the axial and transverse directions.

WHAT WE CLAIM IS:—

1. A ball and socket joint, comprising a ball-headed shaft, a socket and a one-piece bearing shell interposed between the ball head and the interior of the socket, the bearing shell being approximately spherical but deviating from the spherical in some regions such that in some regions it closely engages the ball head but in other regions is spaced therefrom to provide a resilient support between the ball head and the interior of the socket.

2. A ball and socket joint as claimed in Claim 1, wherein the bearing shell is made of spring steel.

3. A ball and socket joint as claimed in Claim 1 or 2, wherein the bearing shell is formed in the region of one or both of its poles with prongs or teeth centrically converging towards the pole or poles and having a radius of curvature which is less than that of the other regions of the bearing shell.

4. A ball and socket joint as claimed in Claim 3, wherein the prongs of the shell overlap in the equatorial region of the shell.

5. A ball and socket joint as claimed in any one of Claims 1 to 4, wherein the shell is internally provided with a sliding layer of metal or plastics.

6. A ball and socket joint substantially as hereinbefore described with reference to Figure 1, Figures 2 and 3, Figure 4 or 5, or Figures 6 and 7 of the accompanying drawings.

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Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1970.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

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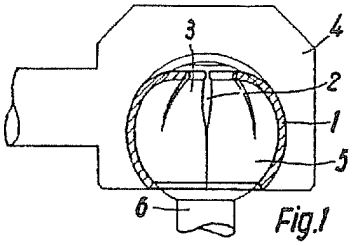
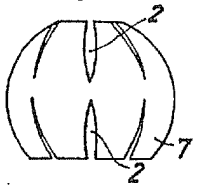


Fig.1

Fig.2


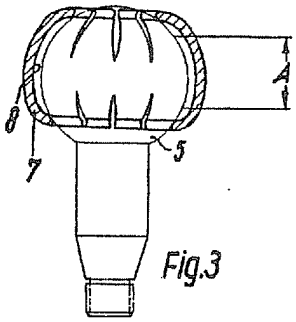


Fig.3

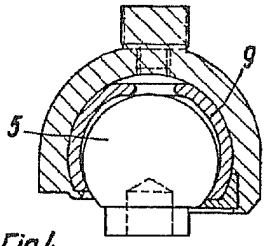


Fig.4

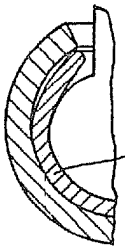


Fig.5

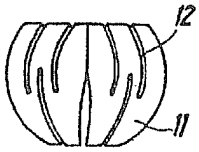


Fig. 6

Fig.7